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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,251	02/27/2004	Ian McGregor Slothers		1337
441	7590	07/27/2005		
SMITH, GAMBRELL & RUSSELL, LLP 1850 M STREET, N.W., SUITE 800 WASHINGTON, DC 20036				
			EXAMINER LE, JOHN H	
			ART UNIT 2863	PAPER NUMBER

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/787,251

Applicant(s)

SLOTHERS ET AL.

Examiner

John H. Le

Art Unit

2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-79 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38-58 and 70-72 is/are allowed.
- 6) ☐ Claim(s) 1-8, 19-26, 59-69 and 73-79 is/are rejected.
- 7) ☒ Claim(s) 9-18 and 27-37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/15.03/28.06/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### *Specification*

1. The abstract of the disclosure is objected to because of the form and legal phraseology often used in patent claims, such as "said" (lines 3, 4, 6, 7, 8, 9, 10) should be avoided.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-8, 19-26, 59, 60, 61-65, 73-76 are rejected under 35 U.S.C. 102(e) as being anticipated by Freeman et al. (USP 6,816,797).

Regarding claims 1, 19, 59, 60, Freeman et al. teach an apparatus for generating an output dependant upon the impedance or at least one component of the impedance of a device (e.g. Col.2, lines 34-54), the apparatus comprising: a load component (100) having a known impedance or at least one component thereof for connection in series with said device (e.g. cells, Fig.1, Col.5, lines 16-23); a signal generating arrangement (power supply voltage) for generating an electrical signal for application to the series connected load component and device (e.g. Col.6, lines 51-60); a measurement channel (21) for measuring voltages (e.g. Col.5, lines 36-55); a switch (22) arrangement

Art Unit: 2863

connected to said measurement channel for switching the measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component (e.g. Col.5, lines 36-55, Col.6, lines 36-60); and a processing arrangement connected to said measurement channel for processing the sequentially measured voltages to generate an output dependant upon said impedance or said at least one component of impedance of said device (e.g. Col.5, line57-Col.6, line 9, Col.6, lines 36-60).

Regarding claims 2-8, 20-26, Freeman et al. teach wherein said signal generating arrangement is adapted to generate said signal comprising sequential signal blocks (21, 120) for application to said series connected load component and device, wherein said switch arrangement is adapted to switch (22) said measurement channel to measure each of said voltages during the same part of the signal block of sequential signal blocks of said signal (e.g. Col.5, lines 36-55), wherein said signal generating arrangement includes a digital store storing a signal pattern for at least a part of a said signal block (e.g. Col.5, line 57-Col.6, line 9), generator means (power supply voltage) for generating a digital signal by repeatedly using the stored signal pattern (e.g. Col.5, line57-Col.6, line 9, Col.6, lines 51-60), and a digital-to-analogue converter (50) for converting the digital signal to the signal, wherein said signal generating arrangement and said processing arrangement are adapted to operate synchronously, wherein said switching (22) arrangement is adapted to switch each of said measurement channels to sequentially measure said voltages to allow simultaneous measurements in the

measurement channels, and said processing arrangement is adapted to process the sequentially measured voltages for each channel, wherein said processing arrangement comprises a digital processing arrangement, and said measurement channels include a common multiplexer (22) arrangement and a common analogue-to-digital converter (70), wherein said processing arrangement is adapted to generate the output as a measure of impedance or at least one component of the impedance of said device (e.g. Fig.1, Col.5, line 24-Col.6, line 8), wherein said processing means is adapted to generate said output as an indication of whether or not a factor related to the impedance or at least one component thereof is above or below a threshold (e.g. [0058]).

Regarding claims 61-63, Freeman et al. teach a method of calibrating apparatus for generating an output in dependence upon the impedance or at least one component of the impedance of a device, the apparatus including a load component having an unknown impedance or at least one component (e.g. Col.2, lines 32-54) thereof the method comprising: connecting a test load component having a known impedance or at least one component thereof to said apparatus in place of said device and in series with said load component(e.g. Col.5, lines 16-35); applying a voltage signal across said series connected test load component and load component (e.g. Col.5, lines 24-35); obtaining measurements indicative of the voltage across said test load component and current in said test load component (e.g. Col.5, lines 36-56); processing the measurements to determine a value dependent upon the impedance or at least one component of the impedance of the load component (e.g. Col.5, lines 57-Col.6, line 8,

Art Unit: 2863

Col.6, lines 36-50); and storing the determined value for later use in the generation of an output (e.g. Col.5, lines 24-35, Col.5, lines 57-Col.6, line 8).

Regarding claims 64-65, Freeman et al. teach an apparatus for generating an output in dependence upon the impedance or at least one component of the impedance of a device (e.g. Col.2, lines 32-54), the apparatus comprising: a load component (100) having a known impedance or at least one component thereof for connection in series with said device (e.g. cells, Fig.1, [0034]); a generator (power supply voltage) arrangement for applying a voltage signal to said series connected load component and device (e.g. Col.5, lines 24-56, Col.6, lines 51-60); a measurement (21) arrangement adapted to measure the voltage across said device and a voltage drop across said load component to obtain a measurement of the current said device (e.g. Col.5, lines 36-56); a test load component (test fuel cell stack) having a known impedance or at least one component of the impedance for connection in place of said device and in series with said load component for calibration of said load component (e.g. Col.5, lines 16-35); calibration processing means for processing the measurements when said test load component is connected in place of said device to determine and store a value dependent upon the impedance or at least one component of the impedance of the load component (e.g. Col.9, line 7-Col.6, lines 42); and signal processing means (CPU 20) for processing said measurements when said device is connected to generate an output in dependence upon the impedance or at least one component of the impedance of said device using the stored value (e.g. Col.5, lines 57-Col.6, line 8, Col.6, lines 36-50).

Regarding claims 73-76, Freeman et al. teach an apparatus for generating an output dependent upon the impedance or at least one component of the impedance of a device (e.g. Col.2, lines 32-54), the apparatus comprising: a load component (100) having a known impedance for connection in series with the device to allow for the measurement of a voltage drop across the load component (e.g. cells, Fig.1, [0034]); a generator (power supply voltage) arrangement for applying a voltage to the series connected load component and device (e.g. Col.5, lines 24-56, Col.6, lines 51-60); a measurement (21) arrangement adapted to measure a first voltage one side of said load component, and a second voltage on the other side of said load component or a difference voltage comprising the voltage difference across said load device (e.g. [0036]); and a signal processing (CPU 20) arrangement for processing the measurements to generate an output dependent upon the impedance of said device (e.g. Col.5, lines 57-Col.6, line 8, Col.6, lines 36-50); wherein said signal processing arrangement is adapted to monitor said measurements to detect fault conditions in said device and to output a warning output if a fault condition is detected (e.g. Col.8, lines 10-Col.10, lines 8), wherein said signal processing arrangement is adapted to detect a fault condition when at least one said measurement is outside a predetermined threshold or range (e.g. Col.9, lines 37-49).

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

Art Unit: 2863

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 66-69 and 77-79 are rejected under 35 U.S.C. 102(e) as being anticipated by Slates et al. (US 2003/0222639).

Regarding claims 66-69, 77-79 Slates et al. teach a method of identifying a device having an impedance characteristic as a function of frequency (e.g. [0051], [0207]), the method comprising: applying at least two frequency signals to said device (e.g. [0093]); obtaining parameters indicative of the voltage across said device and the current flowing through said device at said frequencies (e.g. [0092]-[0093]); and comparing said parameters for said device with parameters for at least one other device to identify said device (e.g. [0229], [0233], [0240]).

***Allowable Subject Matter***

6. Claims 38-58 and 70-72 are allowed.

Claims 9-18, 27-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 9, none of the prior art of record teaches or suggests the combination of an apparatus for generating an output dependant upon the impedance or at least one component of the impedance of a device, the apparatus comprising: a load component having a known impedance or at least one component thereof for



Art Unit: 2863

connection in series with said device; a signal generating arrangement for generating an electrical signal for application to the series connected load component and device; a measurement channel for measuring voltages; a switch arrangement connected to said measurement channel for switching the measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component; and a processing arrangement connected to said measurement channel for processing the sequentially measured voltages to generate an output dependant upon said impedance or said at least one component of impedance of said device, wherein said processing means is adapted to generate said output as an indication of whether or not a factor related to the impedance or at least one component thereof is above or below a threshold, and wherein said processing arrangement is adapted to: determine a first parameter indicative of the complex amplitude of the first voltage on a first side of said load component connected to said device, and a second parameter indicative of the complex amplitude of the difference between the first and second voltages or said voltage difference; multiply each of the first and second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively; and compare said third and fourth parameters to generate said output, or compare one or more components or derivatives of the third parameter and one or more components or derivatives of said fourth parameter to generate said output. It is these limitations as they are claimed in the combination with other

Art Unit: 2863

limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 15, none of the prior art of record teaches or suggests the combination of an apparatus for generating an output dependant upon the impedance or at least one component of the impedance of a device, the apparatus comprising: a load component having a known impedance or at least one component thereof for connection in series with said device; a signal generating arrangement for generating an electrical signal for application to the series connected load component and device; a measurement channel for measuring voltages; a switch arrangement connected to said measurement channel for switching the measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component; and a processing arrangement connected to said measurement channel for processing the sequentially measured voltages to generate an output dependant upon said impedance or said at least one component of impedance of said device, wherein said processing means is adapted to generate said output as an indication of whether or not a factor related to the impedance or at least one component thereof is above or below a threshold, and wherein said signal generating arrangement is adapted to generate said electrical signal comprising a plurality of frequency components and said processing arrangement is adapted to determine a first parameter indicative of the complex amplitude of the first voltage on said first side of said load component for each said frequency, and a second parameter indicative of the complex amplitude of the

difference between the first and second voltages or said voltage difference for each said frequency, to multiply each of the first and second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively, and to compare said third and fourth parameters to generate said output, or compare one or more components or derivatives of the third and fourth parameters to generate said output. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 27, none of the prior art of record teaches or suggests the combination of a method of generating an output dependent upon the impedance or at least one component of the impedance of a device, the method comprising: connecting a load component having a known impedance or at least one component thereof in series with said device; applying an electrical signal to said electrical arrangement to generate said parameters; using a measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component; and processing the sequentially measured voltages to generate an output dependent upon said impedance or at least one component of the impedance of said device, wherein said processing includes determining a first parameter indicative of the complex amplitude of the first voltage on a first side of said load device connected to said device, and a second parameter indicative of the complex amplitude of a difference between the first and second voltages or said voltage difference; multiplying each of the first and

Art Unit: 2863

second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively; and comparing said third and fourth parameters to generate said result. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 33, none of the prior art of record teaches or suggests the combination of a method of generating an output dependent upon the impedance or at least one component of the impedance of a device, the method comprising: connecting a load component having a known impedance or at least one component thereof in series with said device; applying an electrical signal to said electrical arrangement to generate said parameters; using a measurement channel to sequentially measure a first voltage on a first side of said load component, and one of a second voltage on a second side of said load component or a voltage difference across said load component; and processing the sequentially measured voltages to generate an output dependent upon said impedance or at least one component of the impedance of said device, wherein the processing generates said output a an indication of whether or not a factor related to the impedance or at least one component of the impedance is above or below a threshold, and wherein said electrical signal comprises a plurality of frequency components and said processing includes determining a first parameter indicative of the complex amplitude of the first voltage on said first side of said load component for each said frequency, and a second parameter indicative of the complex amplitude of the

Art Unit: 2863

difference between the first and second voltages or said voltage difference for each said frequency, multiplying each of the first and second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively, and comparing said third and fourth parameters to generate said output, or comparing one or more components or derivatives of the third and fourth parameters to generate said output. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 38, none of the prior art of record teaches or suggests the combination of apparatus for generating an output dependent upon the impedance or at least one component of the impedance of a device, the apparatus comprising: a load component having a known impedance or at least one component thereof for connection in series with the device to allow for the measurement of a voltage drop across the load component; a generator arrangement for applying a signal having a voltage to the series connected load component and device; a measurement arrangement adapted to measure a first voltage one side of said load component, and one of a second voltage on the other side of said load component or a difference voltage comprising the voltage difference across said load device; and a signal processing arrangement for processing the measurements to generate an output dependent upon the impedance or at least one component of the impedance of the device, wherein said processing arrangement is adapted to: determine a first parameter indicative of the complex amplitude of the first voltage on a first side of said load

Art Unit: 2863

component connected to said device, and a second parameter indicative of the complex amplitude of said difference voltage or a calculated difference voltage comprising the difference between the first and second voltages; multiply each of the first and second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively; and compare said third and fourth parameters to generate an output or compare one or more components or derivatives of the third parameter and said fourth parameter to generate said output. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 48, none of the prior art of record teaches or suggests the combination of a method of generating an output dependent upon the impedance or at least one component of the impedance of a device, the method comprising: connecting a load component having a known impedance or at least one component of the impedance in series with the device to allow for the measurement of a voltage drop across the load component; applying a signal having a voltage to the series connected load component and device; measuring a first voltage one side of said load component, and a second voltage on the other side of said load component or a difference voltage comprising the voltage difference across said load device; and processing the measurements to generating an output dependent upon the impedance or at least one component thereon wherein said processing comprises: determining a first parameter indicative of the complex amplitude of the first voltage on a first side of said load

Art Unit: 2863

component connected to said device, and a second parameter indicative of the complex amplitude of said difference voltage or a calculated difference voltage comprising the difference between the first and second voltages; multiplying each of the first and second determined parameters by the complex conjugate of the second determined parameter to generate third and fourth parameters respectively; and comparing said third and fourth parameters to generate said output or comparing one or more components or derivatives of the third parameter and said fourth parameter. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 70, none of the prior art of record teaches or suggests the combination of a proximity sensor for sensing the proximity of a target comprising: an electrical component for sensing the proximity of the target, said electrical component having electrical properties that vary with the proximity of the target; a impedance component having a known impedance and a first end connected to a first end of said electrical component; a switch connected to switch between said first end of said impedance component and a second end of said impedance component; a signal generator connected to said second end of said impedance component for generating an electrical signal for application to the impedance component and electrical component; an analogue-to-digital converter for receiving a digital signal and for generating a proximity signal, wherein said processor is adapted to control said switch to switch to connect to said first and second ends of said impedance component

Art Unit: 2863

sequentially; and a processor connected to the analogue-to-digital converter for receiving a digital voltage signal and for generating a proximity signal, wherein said processor is adapted to control said switch to switch to connect to said first and second ends of said impedance component sequentially. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

### ***Contact Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John H Le whose telephone number is 571-272-2275. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on 571-272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Application/Control Number: 10/787,251

Page 16


Art Unit: 2863

John H. Le

Patent Examiner-Group 2863

July 20, 2005

**BRYAN BUI**  
**PRIMARY EXAMINER**

A handwritten signature in black ink, appearing to read "Bryan Bui", written in a cursive style.